

CLAIMS

What is claimed is:

- 1 1. A magnetic head, comprising:
2 a free layer;
3 an antiparallel (AP) pinned layer structure spaced apart from the free layer; and
4 a high coercivity structure positioned towards the AP pinned layer structure on an
5 opposite side thereof relative to the free layer, the high coercivity structure
6 pinning a magnetic orientation of the AP pinned layer structure.

- 1 2. A head as recited in claim 1, wherein the AP pinned layer structure includes at
2 least two pinned layers having magnetic moments that are self-pinned antiparallel
3 to each other, the pinned layers being separated by an AP coupling layer.

- 1 3. A head as recited in claim 2, wherein the pinned layers of the AP pinned layer
2 structure are formed of CoFe.

- 1 4. A head as recited in claim 2, wherein a magnetic thickness of the high coercivity
2 structure and the pinned layer of the AP pinned layer structure positioned closest
3 thereto is about equal to a magnetic thickness of the pinned layer of the AP
4 pinned layer structure positioned farthest from the high coercivity structure.

- 1 5. A head as recited in claim 1, wherein the high coercivity structure includes a layer
2 of CoPtCr.
- 1 6. A head as recited in claim 5, wherein the high coercivity structure further includes
2 an amorphous layer positioned between the layer of CoPtCr and the AP pinned
3 layer structure.
- 1 7. A head as recited in claim 6, wherein the amorphous layer comprises CoFeX,
2 where X is selected from a group consisting of Nb, Zn and Hf.
- 1 8. A head as recited in claim 5, wherein the high coercivity structure further includes
2 a seed layer of magnetic material under the CoPtCr, the seed layer allowing
3 proper growth of the CoPtCr.
- 1 9. A head as recited in claim 1, wherein the head forms part of a GMR head.
- 1 10. A head as recited in claim 1, wherein the head forms part of a CPP GMR sensor.
- 1 11. A head as recited in claim 1, wherein the head forms part of a CIP GMR sensor.
- 1 12. A head as recited in claim 1, wherein the head forms part of a tunnel valve sensor.
- 1 13. A magnetic head, comprising:

2 a free layer;
3 an antiparallel (AP) pinned layer structure spaced apart from the free layer;
4 a layer of CoPtCr positioned towards the AP pinned layer structure on an opposite
5 side thereof relative to the free layer, layer of CoPtCr pinning a magnetic
6 orientation of the AP pinned layer structure; and
7 an amorphous layer positioned between the layer of CoPtCr and the AP pinned
8 layer structure.

1 14. A head as recited in claim 13, wherein the AP pinned layer structure includes at
2 least two pinned layers having magnetic moments that are self-pinned antiparallel
3 to each other, the pinned layers being separated by an AP coupling layer.

1 15. A head as recited in claim 14, wherein the pinned layers of the AP pinned layer
2 structure are formed of CoFe.

1 16. A head as recited in claim 14, wherein a magnetic thickness of the layer of
2 CoPtCr, amorphous layer, and the pinned layer of the AP pinned layer structure
3 positioned closest to the amorphous layer is about equal to a magnetic thickness
4 of the pinned layer of the AP pinned layer structure positioned farthest from the
5 amorphous layer.

1 17. A head as recited in claim 13, wherein the amorphous layer comprises CoFeX,
2 where X is selected from a group consisting of Nb, Zn and Hf.

- 1 18. A head as recited in claim 13, further comprising a seed layer of magnetic
2 material upon which the CoPtCr is formed.
- 1 19. A head as recited in claim 13, wherein the head forms part of a GMR head.
- 1 20. A head as recited in claim 13, wherein the head forms part of a CPP GMR sensor.
- 1 21. A head as recited in claim 13, wherein the head forms part of a CIP GMR sensor.
- 1 22. A head as recited in claim 13, wherein the head forms part of a tunnel valve
2 sensor.
- 1 23. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head for reading from and writing to the magnetic media, each head
4 having:
5 a sensor having the structure recited in claim 1;
6 a writer coupled to the sensor;
7 a slider for supporting the head; and
8 a control unit coupled to the head for controlling operation of the head.
- 1 24. A magnetic storage system, comprising:

- 2 magnetic media;
- 3 at least one head for reading from and writing to the magnetic media, each head
- 4 having:
- 5 a sensor having the structure recited in claim 13;
- 6 a writer coupled to the sensor;
- 7 a slider for supporting the head; and
- 8 a control unit coupled to the head for controlling operation of the head.